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TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN, that we: Ki S. Kim, a citizen of the United States and a resident  
25 of Gaithersburg, Maryland, and Jiyul Yoo, a citizen of the Republic of Korea and  
a resident of Vienna, Virginia have invented certain new and useful  
improvements in

30 **NATIVE LANGUAGE DOMAIN NAME REGISTRATION AND USAGE,**  
of which the following is a specification.

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# NATIVE LANGUAGE DOMAIN NAME REGISTRATION AND USAGE

## FIELD OF THE INVENTION

5 The present invention relates generally to communications networks. More particularly, the present invention relates to a method and apparatus for accommodating non-English language naming system to address and to direct accesses of entities of a communication network, particularly in the world-wide-web (WWW).

## BACKGROUND OF THE INVENTION

10 The Internet, particularly the world-wide-web (WWW), provides a plethora of information sources, each of which offers useful information, goods and services, typically in the form of hyper-text mark-up language (HTML) pages (web pages), to users of the vast computer network. As it is well known, typically, a user utilizes a  
15 web browser, e.g., the NAVIGATOR® from the Netscape Communications Corporation of Mountain View, CA, USA, or the INTERNET EXPLORER® from the Microsoft Corporation of Redmond, Washington, USA, installed on his/her computer to access a desired web page.

20 In order to access a particular web page, the user web browser must know the address of the desired destination web site within the network, i.e., the Internet. In particular, in the case of the WWW, the addresses are referred to as the Internet Protocol (IP) addresses. An IP address has a numeric format, e.g., 123.456.78.9. Each server hosting a website in the WWW is given a unique IP address.

25 However, as the number of web pages in the WWW (already in the hundreds of billions) rapidly increases, a more intuitive addressing convention that uses alpha-numeric aliases that can be more easily remembered is devised. An address according to the newly devised addressing system is commonly referred to as an Universal Resource Locator (URL), which typically has a syntax, "protocol://www.domain-name.domain". The protocol may be, e.g., hypertext  
30 transfer protocol (HTTP) for WWW. The domain specifies which of the high-level division of the entire Internet, the addressee belongs to, and can be, for example,

“com”, “org”, “net” or the like (domains in countries other than the United States may include the country indicator, e.g., co.uk, which indicates a commercial domain in the United Kingdom). The domain-name and the domain fields together serve as the alias for the actual IP address. The domain-name may be arranged as a plurality of sub names, e.g., “subname 1.subname 2....subname *n*.” For example, an URL, http://www.xyz.com specifies a server in the world-wide-web hosting a web site for the xyz company.

A special server, called a domain name server (DNS), placed in the Internet maintains a global directory that maps domain names, e.g., the “xyz.com”, to the corresponding actual IP addresses, e.g., 123.456.78.9, of the server hosting the web site for the xyz company. The DNS server may be more than one physically separate computers, and may be organized in a hierarchical manner. When a user enters an URL in the web browser installed on the user computer, the web browser inquires the DNS server for the IP address associated with the particular URL. Once, the web browser obtains the IP address from the DNS server, a connection is established between the user web browser and the server application at that IP address.

There is a non-ambiguous one-to-one correspondence between each URL and its associated IP address. In order to ensure the integrity of the unique correspondence between an URL and the associated IP address, it must be ensured that no two different servers, having different IP address from each other, share the same URL. To that end, there is a registration system in place to ensure only one registrant is assigned a particular “domain name”. Presently, the authority for the registration system is with a non-profit organization, called the Internet Corporation for Assigned Names and Numbers (ICANN). Also at the present time, only one registrar for each of the domains are allowed to accept registration of domain names. For example, in the case of the “.com”, “.org” and the “.net” domains, the Network Solutions, Inc. (NSI), of Herndon, Virginia, USA, is the only authorized registrar for domain names. Once, a registrant registers a domain name with an authorized registrar, e.g., registering a “.com” domain name with NSI, no other entity may register the same domain name. Once a domain name is

registered, the DNS directory is updated with a new entry assigning the newly registered domain name to the registrant's web hosting server IP address.

While the URL system and domain name registration system have greatly improved the convenience of addressing convention over the numerical IP address system, the current system is very inconvenient particularly for users of the Internet in non-English speaking countries. Because, heretofore, each character of all domain names were required to be in the form of alphanumeric character, (e.g., a character from A-Z, a number from 0-9, or perhaps a hyphen "-"), users of non-English speaking countries were forced to attempt to spell their native language words using English alpha-numeric characters. Unfortunately, because the English alphabet is inadequate in representing each and every possible phonetic sound of every language, a foreign language (a non-English native language) word may be spelled several different ways using English alphabets, often times, none of which can truly represent the native pronunciation of the word. For example, a Korean speaking Internet user may try to phonetically spell the Korean word, "가나다", which is roughly equivalent to "ABC" in English, as, *inter alia*, "Kanada", "Ganada" or even "Ghanahdah" (many other spelling may be possible).

The above multiple spelling possibility problem creates numerous sources of confusions, frustrations and inconveniences when exchanging URL information between users of the WWW in those non-English speaking countries. Frequently, when providing an URL information, rather than simply uttering the whole word, the entire domain name must be spelled out one character at a time, making it extremely inconvenient to those not well versed in English. Moreover, businesses in those non-English speaking countries, even when a suitable native word that perfectly describes the services offered by a particular business, opt not to use the word as the domain name for the business because of the likeliness of confusion with respect to the English alpha-numeric spelling of the word.

Furthermore, the requirement that a non-English speaking WWW user must remember an English word in-and-of-itself is an inconvenience that makes the current domain name system less desirable.

There is thus a need for a method of and system for registration and usage of native language domain names, which may comprise one or more non-English alpha-numeric characters.

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### **SUMMARY OF THE INVENTION**

In accordance with the principles of the present invention, a method of registering a domain name comprises receiving a request for registration of a native language domain name, the native language domain name including at least one non-alphanumeric character, converting each of the at least one non-alphanumeric character to a corresponding alphanumeric character to produce an alphanumeric domain name, and registering the alphanumeric domain name with an authorized alphanumeric domain name registrar.

In addition, in accordance with the principles of the present invention, a method of establishing a communication link between a user computer and a destination website over a world wide web network comprises receiving a universal resource locator of the destination website, the universal resource locator having a native language domain name that comprises at least one non-alphanumeric character, converting each of the at least one non-alphanumeric character to a corresponding alphanumeric character to produce an alphanumeric domain name, performing a domain name server inquiry using the alphanumeric domain name to obtain an Internet Protocol (IP) address of the destination website, and establishing the communication link between the user computer and the destination website using the Internet Protocol (IP) address.

Moreover, in accordance with the principles of the present invention, A domain name registration system comprises a native language domain name registrar configured to receive a request for registration of a native language domain name, the native language domain name including at least one non-alphanumeric character, wherein the native language domain name registrar is configured to convert each of the at least one non-alphanumeric character to a corresponding alphanumeric character to produce an alphanumeric domain name,

and is further configured to register the alphanumeric domain name with an authorized alphanumeric domain name registrar.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

5           Features and advantages of the present invention will become apparent to those skilled in the art from the following description with reference to the drawings, in which:

          Fig. 1 shows an exemplary embodiment of the Internet including the native domain name registration and usage system, in accordance with the principles of  
10       the present invention;

          Fig. 2A shows an exemplary embodiment of the relevant portions of native language domain name format and the format of the unique corresponding alphanumeric domain name for registration, in accordance with the principles of the present invention;

15           Fig. 2B shows an alternative exemplary embodiment of the relevant portions of native language domain name format and the format of the corresponding unique alpha-numeric domain name that includes a language code field, for registration, in accordance with the principles of the present invention;

          Fig. 3 shows a flow chart depicting an illustrative exemplary embodiment of a  
20       process of registering a native language domain name, in accordance with the principles of the present invention;

          Fig. 4 shows an illustrative exemplary embodiment of communications between a user web browser, a domain name service (DNS) server and the destination web site, in accordance with the principles of the present invention; and

25           Fig. 5 shows an illustrative exemplary embodiment of web browser display screen, in accordance with the principles of the present invention.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

For simplicity and illustrative purposes, the principles of the present invention are described by referring mainly to registration and usage of Korean domain names. However, one of ordinary skill in the art would readily recognize that the same principles are equally applicable to and can be implemented for domain names in any language.

In accordance with the principles of the present invention, a domain name system includes a native language domain name registrar, which receives a native language domain name registration request. The native language domain name comprises at least one non-alphanumeric character not included in the allowable character set for domain name registration, i.e., the English alphabets A through Z, the Arabic numbers 0 through 9 and the hyphen "-". Each of the non-alphanumeric characters is converted to a string of alphanumeric characters to produce a alphanumeric domain name comprised of strings of alphanumeric characters uniquely representing the native language domain name being requested to be registered. The resulting alphanumeric domain name is registered with the domain name registration system, and is used in the domain name/IP address entry in the domain name server (DNS). An algorithm based conversion between each of the native language character and the corresponding alphanumeric character string to maintain a unique correspondence between a native language character and the corresponding alphanumeric character string. The same algorithm may be provided to the web browsers installed on the computer of a world-wide-web (WWW) user to convert native language domain names to the corresponding alphanumeric domain names, which are ultimately used for domain name lookup process during the respective WWW browse sessions.

In particular, Fig. 1 is a block diagram showing the relevant portions of the world-wide-web (WWW) network **100** in accordance with an embodiment of the present invention. The WWW network comprises an interconnect fabric **101**, through which each of the Alphanumeric Domain Name Registrar (ADNR) **102**, the DNS server **103**, a Domain Name Registrant (DNR) **104**, a Native Language

Domain Name Registrar (NLDNR) **105** and a User computer **107** communicate with each other.

The interconnect fabric **101** is a wide area network (WAN), and may comprise a plurality of computers, routers, gateways and/or portions of the Public Switched Telephone Network (PSTN), as known to those familiar with the architecture of the Internet.

The ADNR **102** is the authorized registrar of domain names for a particular domain. For example, at the present time, in the case of the ".com", ".org" and the ".net" domains, the Network Solutions, Inc. (NSI), of Herndon, Virginia, USA, is the only authorized registrar for domain names. Although, by way of an example, only one ADNR **102** is shown in Fig. 1, in practice, there are a number of ADNRs **102**, each of which may serve as the registrar for a particular domain, e.g., ".gov", ".co.uk", "co.kr" and the like.

A DNR **104** may be an individual or a business concern that desires to obtain a "web address" for its website **106** being hosted by a hosting server (not shown) having an IP address, e.g., 123.456.78.9. Although by way of example, only one DNR **104** is shown, there may be any number of DNRs **104**. Once, a DNR **104** registers a domain name with an authorized ADNR **102**, e.g., registering a ".com" domain name with NSI, no other entity may register the same domain name. In response to a request from a DNR **104** for registration of a domain name, e.g., "xyz.com", the ADNR **102** reserves the requested domain name for the exclusive use by the requesting DNR **104**. The requesting DNR **104** may opt to "park" the newly registered domain name until its website **106** is developed and launched by releasing to the rest of the WWW. The website when launched is typically placed on a web hosting server (not shown). Once a domain name is registered, and the associated website is launched, the DNS directory in the DNS server **103** is updated with a new entry assigning the newly registered domain name to the registrant's web hosting server IP address.

In accordance with the principles of the present invention, the WWW **100** may include a NLDNR **105** for receiving a request for registration of a native language domain name. A native language domain name in accordance with the



present invention, and for the purpose of description thereof herein, is defined as a domain name having a string of characters, at least one of which being a non-alphanumeric character, i.e., a character not in the set of characters currently allowed in domain names, namely the English alphabets, A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y and Z (in either upper or lower case), the Arabic numbers, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and the hyphen "-".

For example, NLDNR **105** may receive from the DNR **104** a request for registration of a native language domain name, "가나다.com", "가나다" being a Korean writing, and each of the characters, "가", "나" and "다" being a non-alphanumeric character. According to an embodiment of the present invention, upon receiving the request, the NLDNR **105** converts the native language domain name to an alphanumeric domain name according to a standard conversion algorithm preferably adapted by the entire WWW community. The conversion algorithm will be described in more detail later. The NLDNR **105** reserves the native domain name for the exclusive use by the requesting DNR **104**, and registers the converted alphanumeric domain name corresponding to the native language domain name with the ADNR **102**. The ADNR **102** reserves the requested alphanumeric domain name, and updates the DNS directory in the DNS server **103** with a new entry assigning the newly registered alphanumeric domain name to the registrant's web hosting server IP address as previously explained. Although by way of example, the NLDNR **105** and the ADNR **102** are shown as separate entities, it should be understood that they may be one and the same entity in practice.

A WWW user may use his/her user computer **107** to conduct a WWW browse session using a web browser **108**, e.g., the NAVIGATOR® from the Netscape Communications Corporation of Mountain View, CA, USA, or the INTERNET EXPLORER® from the Microsoft Corporation of Redmond, Washington, USA, installed the user computer **108**. In the case of a user in a non-English speaking countries, the user may be using a version of the web browser **108**, which allows entry of inputs and display of information in the user's native language, e.g.

in Korean. The user computer 107 is typically equipped with a keyboard 109, which, in the case of a non-English speaking user, provides one or more key buttons for entering the user's native language characters.

In accordance with an embodiment of the present invention, the web browser 108 may, in the case of a native language version, include a conversion module which converts a native language domain name entered by the user using the keyboard 109 to the corresponding alphanumeric domain name in the same manner as the NLDNR 105 as mentioned above, and will further be described later. The conversion module thus allows a non-English speaking user to type in a URL in his/her native language to reach the desired website in the WWW.

The native language domain name to the corresponding alphanumeric domain name conversion process will not be described in more detail with references to Figs. 2A and 2B. Fig. 2A shows an exemplary embodiment of the relevant portions of the formats of a native language domain name 201 and its corresponding alphanumeric domain name 202. In particular, the native language domain name 201 may be a string of  $n$  characters 203, i.e., CHAR 1, CHAR 2, CHAR 3....CHAR  $n$ , at least one of the  $n$  characters being a non-alphanumeric character. Any one of the characters of the native domain name 201 may be an alphanumeric character so long as the native language domain name 201 comprises at least one non-alphanumeric character.

A non-alphanumeric character may be, e.g., any characters in any language available on the keyboard of the language of the particular user. For a particular native language, e.g., Korean, Japanese, French, Chinese or the like, each of possible written character is assigned a unique alphanumeric character(s). This assignment of alphanumeric characters to native language characters, in a preferred embodiment of the present invention, is based on the UNICODE™, available from the Unicode Consortium of Mountain View, CA, USA, and from their website whose URL is [www.unicode.org](http://www.unicode.org).

According to the UNICODE™ standard, each possible character of each of native languages is assigned a two byte code, and a byte range is assigned to each language. For example, and by way of example only, the range assignments for a

selective exemplary languages according to the UNICODE™ standard are illustrated below in table I.

TABLE I

NATIVE LANGUAGE	RANGE
Alphabetic Presentation Forms	FB00–FB4F
Arabic Presentation Forms-A	FB50–FDFF
Arabic Presentation Forms-B	FE70–FEFF
Arabic	0600–06FF
Armenian	0530–058F
Latin Extended-A	0100–017F
Latin Extended-B	0180–024F
C1 Controls and Latin-1 Supplement	0080–00FF
C0 Controls and Basic Latin	0000–007F
Bengali	0980–09FF
Bopomofo Extended	31A0–31BF
Bopomofo	3100–312F
Cherokee	13A0–13FF
CJK Compatibility Forms	FE30–FE4F
CJK Compatibility Ideographs	F900–FAFF
CJK Compatibility	3300–33FF
CJK Unified Ideographs Extension A	3400–4DBF
CJK Radicals Supplement	2E80–2EFF
CJK Symbols and Punctuation	3000–303F
CJK Unified Ideographs	4E00–9FAF
Cyrillic	0400–04FF
Devanagari	0900–097F
Ethiopic	1200–137F
Georgian	10A0–10FF
Greek Extended	1F00–1FFF
Greek and Coptic	0370–03FF
Gujarati	0A80–0AFF
Gurmukhi	0A00–0A7F
Korean Compatibility Jamo	3130–318F
Korean Jamo	1100–11FF
Korean Syllables	AC00–D7AF
Hebrew	0590–05FF
Japanese Hiragana	3040–309F
Japanese Katakana	30A0–30FF

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As can be seen from the above Table I, given a string of two byte codes, and seeing that all of the two byte codes fall within a predetermined range, a web

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Fig. 2B shows the format of the alphanumeric domain name **202A** according to an alternative embodiment of the present invention. In this embodiment, the alphanumeric domain name **202A** is similar to the alphanumeric domain name **202**, except that it has at least one additional language code byte **205**, which may be used to indicate the language in which the domain name is to be displayed.

It should be understood that, although by way of example only, a native domain name is illustrated using a Korean domain name, any language domain name may be converted to alphanumeric domain names in accordance with the principles of the present invention described above.

[illegible]

In step **303**, the NLDNR **105** makes an inquiry to the ADNR **102** whether the converted alphanumeric domain name is available for registration by the present requesting registrant, DNR **104**. If the requested alphanumeric domain name is available for registration, i.e., no other registrant has previously registered the same domain name, the NLDNR **105** registers the requested alphanumeric domain name with the ADNR **102** in step **306**, and sends, in step **307**, a confirmation message to the requester, DNR **104** indicating that the requested native domain name is now registered and reserved for the requester's exclusive use. The registration process ends at step **308**.

If, on the other hand, the converted alphanumeric domain name is already registered by another registrant, the NLDNR 105, in step 304, notifies the present requestor that the requested native language domain name is unavailable for

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IP address corresponding to the alphanumeric URL, and sends the found IP address **405** to the web browser **402**. The web browser **402** then uses the IP address **405** to establish a communication link between the user web browser **402** and the destination web site **409**, through which the user may access the  
5 information and/or service offered by the web site **409**.

Once the communication link **406** is established, a hyper text markup language (HTML) page **505** of the web site **409** is displayed in the user web browser screen **500**, as shown in Fig. 5.

While the invention has been described with reference to the exemplary  
10 embodiments thereof, those skilled in the art will be able to make various modifications to the described embodiments of the invention without departing from the true spirit and scope of the invention.

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